Kentucky Method 64-626-~~02~~05
Revised ~~12/16/02~~2/25/05
Supersedes 64-626-02
Dated ~~4/23/02~~12/16/02

# RESISTANCE OF CONCRETE TO FREEZE-THAW TESTING

1. SCOPE:

   1.1. This method covers the test to determine the resistivity of concrete specimens to rapidly repeated cycles of freezing in air and thawing in water in the laboratory.

   1.2. Follows ASTM C 666, Procedure B with exceptions and/or modifications. These are shown with the ASTM 666 sections and paragraphs listed for reference.

2. APPARATUS: Subsection 4.4.: Length change comparator will be required .

3. FREEZING AND THAWING CYCLE: Subsection 5.2.: Freeze thaw cycle will be 3 hours ± 0.5 hour.

4. TEST SPECIMENS:

   4.1. Subsection 7.1.: Prepare test specimens in accordance with ASTM C 192 and ASTM C 490 with the following exceptions:

      4.1.1 Coarse Aggregate shall be oven dried to a constant weight, then cooled to room temperature.

      4.1.2. Recombine to achieve a standard gradation. A standard gradation shall be determined by middle of the range percents retained for the appropriate size aggregate being tested. Produce enough material for either two beams for limestone mixes or three beams for gravel mixes. Mix Design outlined in Table 1 and Table 2.

      4.1.3. Prior to mixing, bring coarse aggregate to a saturated condition by soaking in water for approx. 24 hours.

      4.1.4. Proportions for normal weight aggregate mixes as indicated in Tables 1 or 2 as appropriate.

      4.1.5. Proportions for lightweight aggregate to be determined by the Central Materials Laboratory.

      4.1.6. Curing environment shall be immersion in water saturated with calcium hydroxide.

4.2. Subsection 7.2.: Specimens shall be 3 inches in depth, 4 inches in width, and 16 inches in length.

5. PROCEDURE:

5.1. Subsection 8.1.: Beam specimens for lightweight aggregate concrete applications where the concrete will not be exposed to moisture sufficient to approach critical saturation, as determined by the Engineer, shall be cured as follows: Beam specimens shall be immersed in water saturated with calcium hydroxide for a period of 14 days, allowed to air-dry for 14 days, then reimmersed for 24 hours in water prior to freeze thaw testing.

5.2. Subsection 8.3.: Continue each specimen in the test until it has been subjected to a minimum of 350 cycles or until deterioration promotes removal.

6. CALCULATION: Subsection 9.3.: When the 350 cycle count is exceeded, then interpolation of the percent expansion will be necessary. Calculation will be based on the cycle count immediately before and after the 350 cycle count is reached.

7. REPORT:

7.1. Subsection 10.2.4.: Unit weight of fresh concrete is not required.

7.2. Subsection 10.2.6.: Air content of the hardened concrete is not required.

7.3. Subsection 10.5.1.: Dimensions of specimens at zero cycles of freezing and thawing is not required.

7.4. Subsection 10.5.2.: Weight of specimens at zero cycles of freezing and thawing is not required.

7.5. Subsection 10.6.1.: The durabilty factor shall be reported to the nearest whole number.

7.6. Subsection 10.6.2.: Report the percentage of expansion to the nearest 0.01 percent.

7.7. Reports shall contain the following information:

7.7.1. Producer name

7.7.2. Date beam was cast

7.7.3. Ledge or Bench location

7.7.4. Start and ending date of test

7.7.5. Number of test cycles completed

7.7.6. Bi-weekly length, weight, and fundamental transverse readings

7.7.6. Durability factor

7.7.7. Percent expansion

7.7.9. Pass / Fail determination

APPROVED _____
Director
DIVISION OF MATERIALS

DATE _____~~12/16/02~~2/25/05_____

Kentucky Method 64-~~001-02~~626-05
Revised ~~12/16/02~~2/25/05
Supersedes 64-~~001~~626-02
Dated ~~4/23/02~~12/16/02

~~Km62602~~Km62605.doc

TABLE 1

| LIMESTONE SPECIMENS ( 2 BEAMS ) | | |
|---|---|---|
| | Size #57's, 67's, & 68's | Size # 8's, 9m's, & 78's |
| TYPE 1 CEMENT | 8.5 lbs. | 8.5 lbs. |
| CONCRETE SAND | 18 x 1.0 + % moisture of sand in decimal. (Example: 3.4 % moisture) 18 x 1.034 = 18.6 lbs. | 20 x 1.0 + % moisture of sand in decimal. (Example: 3.4 % moisture 20 x 1.034 = 20.7 lbs. |
| STONE | 28 lbs. | 26 lbs. |
| AIR | 4 - 8 % | 5 - 9 % |
| AIR ENTRAINMENT | 1.3 - 2.5 ml (Adjust As Needed) | 1.5 - 2.0 ml (Adjust As Needed) |
| SLUMP | 2 - 4 Inches | 2 - 4 Inches |
| ESTIMATED WATER (lbs.) | 1.5 - 3.5 lbs. (Adjust As Needed) | 1.5 - 3.5 lbs. (Adjust As Needed) |

TABLE 2

| GRAVEL SPECIMENS ( 3 BEAMS) | | |
|---|---|---|
| | Size #57's, 67's, & 68's | Size # 8's, 9m's, & 78's |
| TYPE 1 CEMENT | 12.75 lbs. | 12.75 lbs. |
| CONCRETE SAND | 27 x 1.0 + % moisture of sand in decimal. (Example: 3.4 % moisture) 27 x 1.034 = 27.9 lbs. | 30 x 1.0 + % moisture of sand in decimal. (Example: 3.4 % moisture 30 x 1.034 = 31.0 lbs. |
| STONE | 36.9 lbs. | 35.0 lbs. |
| AIR | 4 - 8 % | 5 - 9 % |
| AIR ENTRAINMENT | 1.3 - 2.5 ml (Adjust As Needed) | 1.5 - 2.3 ml (Adjust As Needed) |
| SLUMP | 2 - 4 Inches | 2 - 4 Inches |
| ESTIMATED WATER (lbs.) | 1.5 - 3.5 lbs. (Adjust As Needed) | 1.5 - 3.5 lbs. (Adjust As Needed) |